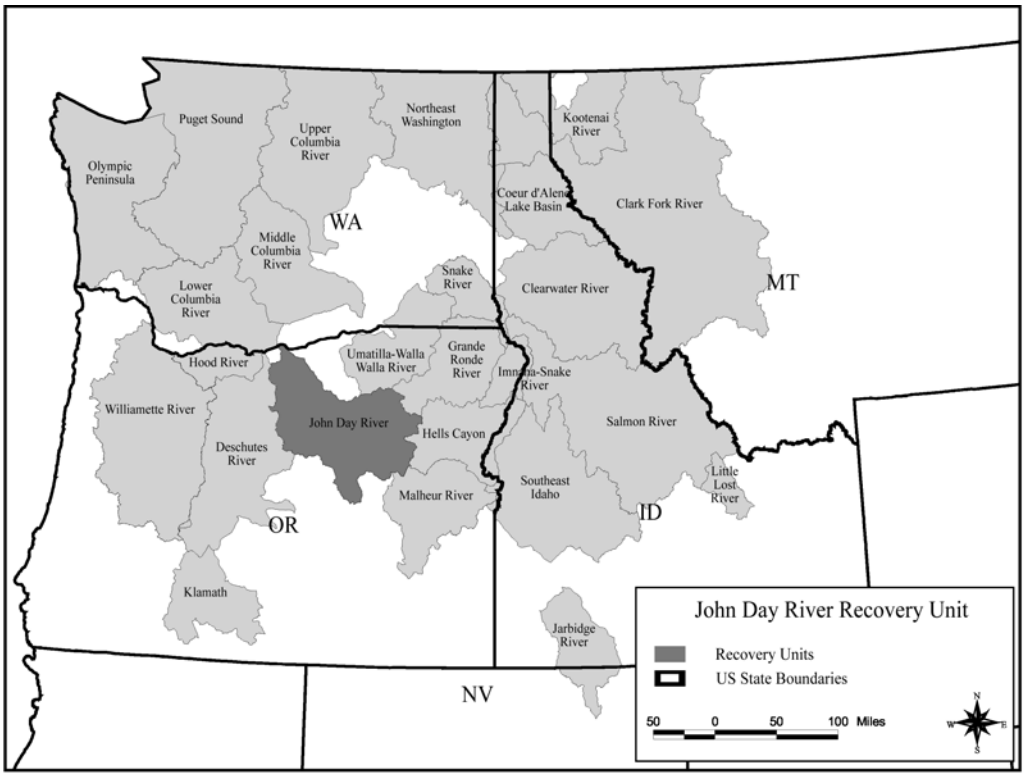
INTRODUCTION

Recovery Unit Designation

The John Day River Recovery Unit is one of 22 recovery units designated for bull trout in the Columbia River basin (Figure 1). Designation of the John Day River Recovery Unit is based on the designation of bull trout in the John Day River basin as a Gene Conservation Group by Oregon Department of Fish and Wildlife (Kostow 1995).

Figure 1. Bull trout recovery units in the United States, with the John Day River Recovery Unit highlighted.



Geographic Description

The John Day River is the fourth largest drainage basin in Oregon, consisting of a mainstem, north, middle, and south forks. The 20,979 square kilometer (8,100 square mile) river basin contains more than 804 kilometers (500

miles) of stream in the mainstem and its three forks and the John Day River is one of the longest free-flowing streams in the continental United States. The mainstem, middle and north forks originate in the Blue Mountains, and the south fork originates in the Ochoco Mountains. The mainstem originates southeast of Prairie City and flows west through John Day to Dayville where it is joined by the south fork. Downstream from Dayville, the river turns north through Picture Gorge and continues on to Kimberly, where it joins with the north fork. The John Day River then flows west from Kimberly for approximately 64 kilometers (40 miles) before turning to the north to the Columbia River confluence at River kilometer 351 (River Mile 218) at an elevation of approximately 61 meters (200 feet) (Oregon Water Resource Department 1986). The lower John Day River from Parish Creek downstream to Tumwater Falls is included in the Oregon Scenic Waterways and National Wild and Scenic River systems.

The largest tributary to the John Day River is the North Fork John Day River which originates in the Elk Horn Mountains at approximately 2,440 meters (8,000 feet) in elevation. From its source, the north fork flows primarily west for 188 kilometers (117 miles) where it joins the mainstem at an elevation of approximately 1,007 meters (3,300 feet) near the town of Kimberly. The North Fork John Day River watershed consists of approximately 155,351 hectares (383,582 acres). The middle fork flows into the north fork upstream of the town of Monument, about 50 kilometers (31 miles) before the confluence of the north fork with the mainstem. The north fork is included in the Oregon Scenic Waterways and National Wild and Scenic River systems from the North Fork John Day wilderness boundary to River kilometer 32.5 (River Mile 20.2) above the town of Monument. Major tributaries to the north fork include Desolation and Granite creeks.

The Middle Fork John Day River originates approximately 16 kilometers (10 miles) east of Austin Junction at an elevation of approximately 2,242 meters (7,350 feet) and flows west for 121 kilometers (75 miles) before it enters the North Fork, 50 kilometers (31 miles) upstream of the town of Kimberly (Oregon Water Resource Department 1986). The Middle Fork John Day watershed consists of approximately 83,257 hectares (205,572 acres). The section from the Crawford Bridge crossing to the confluence with the North Fork is included in the Oregon

Scenic Waterways system. A total of 343 kilometers (213 miles) of fish-bearing streams occur in the upper Middle Fork John Day River and Galena watersheds (Malheur National Forest 1998a).

The South Fork John Day River originates south of the Aldrich Mountains and extends approximately 97 kilometers (60 miles) to its confluence with the mainstem near Dayville. Izee Falls, a 5 meter (15 foot) waterfall followed by a cascading stream segment through large boulders, blocks upstream fish migration. The South Fork John Day River is included in both the Oregon Scenic Waterways and National Wild and Scenic River systems from the Post-Paulina road crossing to Murderers Creek Wildlife Area above Dayville, Oregon.

The John Day River basin is comprised of about 62 percent private, 30 percent U.S. Forest Service, and 7 percent Bureau of Land Management, lands. The State of Oregon manages most of the remaining (less than 1 percent) of the John Day River basin, mostly as wildlife management areas near Bridge Creek and Murderers Creek. Over 95 percent of the basin is zoned for agriculture and forestry uses (Oregon Department of Fish and Wildlife 1990). Most of the land within the John Day River basin is ceded territory to the Confederated Tribes of the Warm Springs Reservation. Part of the North Fork John Day River subbasin is land ceded to the Confederated Tribes of the Umatilla Indian Reservation (Buchanan *et al.* 1997).

About 24,342 hectares (60,103 acres) of land are irrigated in the John Day River basin. Additionally, the Soil Conservation Service identified another 4,860 hectares (12,000 acres) for potential irrigation in the North Fork and lower mainstem John Day River watersheds. Most irrigation water is derived from surface water diversions along the river. The Oregon Department of Fish and Wildlife maintains over 300 rotary drum screens to prevent loss of juvenile salmonids in the diversions (Oregon Department of Fish and Wildlife 1990). Predominant land uses in the basin are agriculture (animal production and animal feed production), timber production, and recreation.

The climate of the John Day River basin is semiarid, characterized by low annual precipitation, low winter temperatures, high summer temperatures and dry summers. Mean annual air temperature is 3 degrees Celsius (38 degrees Fahrenheit) in the upper basin, and 14 degrees Celsius (58 degrees Fahrenheit) in the lower basin. John Day River basin daily temperatures range from below zero at Ukiah and Austin in the winter to above 38 degrees Celsius (100 degrees Fahrenheit) at Arlington in the summer. Inflows of moist Pacific air moderate extreme winter temperatures (Oregon Water Resources Department 1986).

Climate is closely related to, and differs between, the basin's two physiographic provinces: the Deschutes-Umatilla Plateau and the Blue Mountains. Winters are cold on the Deschutes-Umatilla Plateau. In summer, days are generally hot and nights cool. Since moist Pacific air drops most of its precipitation on the Coast Range and Cascade Mountains before reaching the province, the air is dry (Oregon Department of Fish and Wildlife 1990).

The Blue Mountains exhibit a great range of climatic variation due to the diverse physiography of the region. Weather is generally cool to cold in the winter, and hot and dry in the summer, with the exception of the higher elevations of the Blue Mountains. Precipitation across the region is strongly influenced by elevation. Lower elevations are warmer and receive less precipitation than higher elevations. Highlands over 1,525 meters (5,000 feet) elevation receive markedly more precipitation. The average frost-free period is 50 days in the upper basin and 200 days in the lower basin (Oregon Department of Fish and Wildlife 1990).

In the Blue Mountain province, most of the annual precipitation occurs as snow. Seventy percent of the precipitation occurs during the cooler months from November to May. Less than 10 percent falls as rain during July and August. Precipitation ranges from over 102 centimeters (40 inches) in headwater areas to as little as 23 centimeters (9 inches) in the lower elevation areas (Oregon Water Resources Department 1986).

Much of the John Day River basin consists of extensive interior plateau lying between the Cascade Range and the Blue Mountains. The basin includes

portions of two physiographic provinces: the Deschutes-Umatilla Plateau and the Blue Mountains. The Deschutes-Umatilla Plateau province is a broad upland plain formed by floods of molten basalt overlain with wind-deposited sediments. In contrast, the Blue Mountains province is a diverse assemblage of older sedimentary, volcanic, and metamorphic rock that was uplifted, tilted and faulted to form rugged hills and mountains. These two provinces roughly divide the basin in half (Oregon Water Resources Department 1986).

The basin has a complicated geologic history, resulting in a complex and diverse geology. Masses of oceanic crust, marine sediments, various volcanic materials, ancient river and lake deposits, and recent river and landslide deposits contribute to this interesting assemblage of rock.

More than 65 million years ago, during pre-Tertiary time, sediments and volcanic rocks of the oceanic crust were contorted, uplifted and eroded. Roughly 54 to 37 million years ago, a series of widespread volcanic eruptions produced lava, mudflows, and tuffs of the Clarno Formation. The John Day Formation resulted from the deposition of thick layers of volcanic ash from 19 to 37 million years ago. During the period approximately 19 to 12 million years ago, the region experienced volcanic eruptions which resulted in a series of flood basalts known collectively as the Columbia River Basalt Group. Sometime after these basalt flows blanketed the region, fine grained volcanic sediments of the Mascall Formation were deposited locally atop the basalts. The Rattlesnake Formation, a thick sequence of sand and gravel, was finally deposited in the John Day valley 5 to 2 million years ago (Oregon Water Resources Department 1986). The Quaternary Alluvium has been deposited and eroded during the past 2 million years.

Distribution of these formations was largely influenced by the presence of topographic and structural features which developed prior to the Tertiary Period. These older features such as the Strawberry Mountains, Aldrich Mountains, Blue Mountains, and the Blue Mountain anticline still influence the basin. (The Blue Mountain anticline is a long structural unwarping of the Earth's crust extending from Powell Butte to Lewiston, Idaho and should not be confused with the mountain range by the same name) (Oregon Water Resources Department 1986).

The John Day Fault is an east-west fault zone along the base of the Aldrich Mountains and Strawberry Mountains, which influences the location of the John Day River upstream of Picture Gorge. The thick accumulation of fragmented debris representing the Rattlesnake Formation, confined to this portion of the fault zone, shows evidence of a major valley for the past 1.5 to 13 million years (Oregon Water Resources Department 1986).

Loess, volcanic ash, and pumice were deposited over a basalt plateau in this region. Erosional forces have redeposited much of the loess and ash from upland areas to valley bottoms. Soils are comprised of silt, clay loams, stony loams, cobbly loams, and clay (Oregon Department of Fish and Wildlife 1990). Erosional processes are mainly superficial, occurring along steep tributary streams, road corridors, and areas with poor ground cover (Malheur National Forest 1998a).

Gold was formed along with quartz and a host of other low temperature minerals that were last to crystalize from the original magma and found along the margins of huge batholiths that were intruded during the Cretaceous and Jurassic periods. Lode gold is formed as veins and is found along the shattered rock walls of the batholiths. Older gold veins exposed by erosion from ancient and present streams made the gold easily exploitable (Orr *et al.* 1992). Early settlers in the region discovered gold veins by following the crystalline quartz exposed through the surface of the soil. The Blue Mountain region produced about three-fourths of all of Oregon's gold (Orr *et al.* 1992). Although small claims are active to some degree throughout the entire upper basin, most of the active gold mining in the John Day River basin today occurs in the North Fork subbasin.

The John Day River flows over 451 kilometers (280 miles) from its source southeast of Prairie City, Oregon, to its confluence with the Columbia River east of the town of Rufus Oregon. The John Day River is typical of streams in semiarid regions which exhibit extreme variations in seasonal flows and annual discharges. Average annual discharge of the John Day River into the Columbia River is slightly more than 1.9 billion cubic meters (1.5 million acre feet). Due to variations in yearly weather patterns, the total annual discharge varies between 617 million and 3.1 billion cubic meters (0.5 million and 2.5 million acre feet, Oregon Water

Resources Department 1986). Generally, the sources of tributaries to the John Day River are from high elevation springs, and snow melt forming intermittent streams. Therefore, discharge is highest in the spring during snow melt.

The John Day River basin's capacity to store water in snow fields and the subsurface aquifer and gradually release it later in the growing season is greatly diminished due to management practices and land use activities over the past 140 years. Analysis of historic flow data indicates that precipitation falling as snow now runs off immediately instead of staying in the basin. Use of the watershed's resources for forest products and other commodities has increased winter runoff and decreased spring runoff (Oregon Water Resources Department 1986). Timber harvest, road building, loss of riparian vegetation, and over-grazing by livestock are factors influencing increased flooding and scour in tributaries to the John Day River. Increased flooding has resulted in deepened channels and lowered water tables in the immediate vicinity of the deepened channel, further reducing the water holding capacity of the watersheds.

Irrigation water diversions also affect streamflow within the John Day River basin by disrupting the natural flow patterns of the river. Water quality varies with the flow of the river. Excessive turbidity levels are evident during high flow events, and low flows during summer months result in higher than natural stream temperatures (Oregon Water Resources Department 1986).

Coniferous forests and meadows are prevalent above 1,220 meters (4,000 feet); the plant community includes grasses (Gramineae), sagebrush (*Artemisia spp*.), and juniper trees (*Juniperus spp*.), except on north facing slopes where higher moisture levels support vigorous perennial grasses. The lower basin is a plateau of nearly level to rolling Columbia River basalt deeply dissected by the John Day River and tributaries. Vegetation in the lower basin was essentially a bunchgrass (*Agropyron spp*.) climax community with timber at higher elevations, but introduction of livestock grazing and farming has altered its character (Oregon Water Resources Department 1986).

Land uses in the John Day River basin include timber production, transportation, livestock grazing, irrigated agriculture, mining, and recreation. Timber (including special forest products harvesting, reforestation, and stand improvement activities) and livestock grazing are the principal activities which occur on federally administered lands in the John Day River basin (Malheur National Forest 1999a). Currently, recreation is increasing in importance in the basin. Limited road density information is available especially for private land in the headwaters of the upper mainstem John Day River (Malheur National Forest 1999a).

More than a third of the John Day River basin is forested. A large portion of these lands are managed by the U.S. Forest Service (Oregon Water Resources Department 1986). Management policies controlling harvest of timber on these lands has emphasized the extraction of mature trees to supply local mills. Road development to service timber sales has resulted in high road densities on National Forest System lands. In recent years most of the privately owned lands have been selectively cut using ground-based logging equipment on steep (greater than 30 percent) slopes and increasing road density in the area (Malheur National Forest 1998a and 1999) leading to more erosion and hydrologic alteration.

Following the gold rush in California in the mid-1800's, European and other immigrants prospected the John Day River basin area, and established mines and settlements. Early mining practices used water from ditches, hydraulic mining methods, installation of hard rock mills, and later use of bucket line dredges and doodlebugs in the streams. Early Federal minerals legislation encouraged the settlement and economic development of western lands. The General Mining Law of 1872 opened the public domain to mining activities. A significant portion of the private lands in the basin are patented mining claims.

The area is characterized by many placer mines, some of which have been worked since 1862. There are also numerous lode mines with important quartz veins in argillite. Placer deposits in some areas are deep. Historically, these deposits were hydraulically mined when located on hillsides and mined using bucket line dredges in stream bottoms. Extensive gold mining has occurred throughout the upper mainstem

and tributaries, the upper Middle Fork and tributaries, and the North Fork between Desolation Creek and Big Creek and the Granite Creek basin. Large gold dredges operated in the three major basins up until the 1940's. Ongoing recreational and commercial mining operations continue in the basin.

Gold mining continues to be a major activity in the basin. Placer claims are filed on many miles of streams; lode claims are filed on the historic quartz mines as well as on areas of more recent discovery. Gold and silver are the primary minerals extracted. Ditches are still used to transport water to mining sites.

The John Day River watershed is a popular recreation destination, with the heaviest use occurring in summer and fall. Winter use is relatively low, however snowmobile use is increasing. Primary recreation activities occurring in this watershed include camping, hunting, fishing, hiking, mountain biking, horseback riding, all terrain vehicle use, pleasure driving, picnicking, gold panning, snowmobiling, cross-country skiing, and snowshoeing. Big game hunters utilize this area heavily during the fall.

Developed recreation facilities in the John Day River basin are maintained at a limited level. Recreation trails are managed in the more remote areas such as the Strawberry Mountain Wilderness, North Fork John Day Wilderness, and other specially designated recreation areas.

Fish Species

Fish species found in the John Day River basin include spring chinook salmon *(Oncorhynchus tshawytscha)*, steelhead trout (*O. mykiss*), rainbow trout (also referred to as Columbia River redband trout) (*O. mykiss*), westslope cutthroat trout (*O. clarki lewisi*), bull trout (*Salvelinus confluentus*), mountain whitefish (*Prosopium williamsoni)*, Pacific lamprey (*Lampetra tridentata)*, brook lamprey (*Lampetra richardsoni)*, bridgelip sucker *(Catostomus columbianus*), largescale sucker (*Catostomus macrocheilus*), chiselmouth (*Acrocheilus alutaceus)*, speckled dace *(Rhinichthys osculus)*, longnose dace *(Rhinichthys cataractae*), torrent sculpin (*Cottus rhotheus)*, mottled sculpin (*Cottus bairdi*), northern pike minnow *(Ptychocheilus*

oregonensis), and redside shiner (*Richardsonius balteatus)*. These native species are managed by the Oregon Department of Fish and Wildlife for natural production and to insure ecosystem viability.

Brook trout *(Salvelinus fontinalis),* were introduced via stocking on a limited basis in the upper basin and still persist to some degree in several tributaries as well as the mainstem. Smallmouth bass *(Micropterus dolomieui)* were introduced into the lower mainstem John Day River and are managed for their sport fishing value. Other introduced species include: carp *(Cyprinus carpio)*, largemouth bass (*Micropterus salmoides*), black crappie (*Pomoxis nigromaculatus)*, bluegill *(Lepomis macrochirus)*, channel catfish *(Ictalurus punctatus*), bullheads (*Ictalurus spp*.), and Lahontan cutthroat trout *(Oncorhynchus clarki henshawi)*.

DISTRIBUTION AND ABUNDANCE

Status of Bull Trout at the Time of Listing

Bull trout were historically found throughout most of the John Day River basin. Complete distribution is undocumented, but seasonal use of the Columbia River by bull trout from the John Day River system was likely (Claire and Gray 1993). Bull trout in the North Fork John Day River were considered as a population of special concern by Ratliff and Howell (1992). Buchanan *et al.* (1997) considered this population in moderate risk of extinction due to the low number of bull trout detected in snorkel surveys in 1993. Ratliff and Howell (1992) considered bull trout to be extirpated from the Middle Fork John Day River and at high risk of extinction in the tributaries. The status evaluation by Buchanan *et al.* (1997), maintains this assessment with the addition of Clear Creek as a high risk tributary. In the final listing rule (63 FR 31647), six subpopulations identified included: (1) the North Fork John Day River, (2) the Middle Fork John Day River, (3) Granite Boulder Creek, (4) Big Creek, (5) Clear Creek, (6) and the upper mainstem John Day River. Although subpopulations were an appropriate unit upon which to base the 1998 listing decision, the recovery plan has revised the biological terminology to better reflect the current understanding of bull trout life history and conservation biology theory. Therefore, subpopulation terms will not be used in this chapter.

Current Distribution and Abundance

Presently, bull trout distribution is limited primarily to headwaters of the North Fork John Day River, Middle Fork John Day River, and upper mainstem John Day River and tributaries, with seasonal use of the mainstem river downstream to the vicinity of the town of John Day (Ratliff and Howell 1992, Buchanan *et al.* 1997)**.** The John Day River Recovery Unit Team has identified 12 extant local populations in the recovery unit. The known status of each local population occurring in the North Fork, Middle Fork, and upper mainstem John Day River is described below.

North Fork John Day River. Based on distribution information contained in Buchanan *et al.* (1997), and professional judgement of the John Day River Recovery

Unit Team, seven local populations have been identified in the North Fork John Day River subbasin: (1) upper North Fork John Day River (Crawfish, Baldy, Cunningham, Trail, Onion, and Crane creeks as well as the North Fork John Day River upstream of Granite Creek; (2) upper Granite Creek including Bull Run, Deep, and Boundary creeks and the upper mainstem Granite Creek); (3) Boulder Creek; (4) Clear/Lightning creek including Salmon Creek, (5) Clear Creek below the Pete Mann ditch (including Lightning Creek below the ditch), (6) Desolation Creek (includes South Fork Desolation Creek below the falls and North Fork Desolation Creek), and (7) South Fork Desolation Creek above the falls. Based upon inventories conducted in 1992, bull trout distribution in the North Fork John Day River and tributaries is limited to 18 percent of the previously known range (Claire and Gray 1993).

Middle Fork John Day River. Distributional information for the Middle Fork John Day River indicates that three local populations currently exist within the drainage. Local populations include Clear Creek, Granite Boulder Creek, and Big Creek (Buchanan *et al.* 1997). The Malheur National Forest (1998) identifies Deadwood Creek, upper Big Boulder Creek, Badger Creek, Indian Creek, and Vinegar Creek as potential habitat for bull trout local populations (potential local populations).

Current distribution in the Middle Fork John Day River is based on isolated sightings with the primary distribution restricted to tributaries and limited to 22 percent of stream miles previously known to support bull trout (Claire and Gray 1993, Buchanan *et al.* 1997). Biological assessments for the Middle Fork John Day River subbasin (Malheur National Forest 1998a and 1999) and Prairie City Ranger District (Malheur National Forest 1998b) provide detailed descriptions of baseline habitat conditions. Summer distribution of bull trout, based on the 1990 and 1992 Oregon Department of Fish and Wildlife Aquatic Inventory Project, indicated bull trout occupy approximately 16 miles of stream in the Middle Fork John Day River watershed, including: 8.8 kilometers (5.5 miles) in Big Creek, 4 kilometers (2.5 miles) in Deadwood Creek (a tributary to Big Creek), 6.4 kilometers (4 miles) in Granite Boulder Creek; and 6.4 kilometers (4 miles) in Clear Creek. Bull trout migration from these tributary streams during the summer is highly unlikely due to high water temperatures and habitat modifications in the mainstem. Aquatic inventory surveys conducted by the Oregon Department of Fish and Wildlife in 1990 and 1991 detected

60 bull trout in the Middle Fork John Day River basin; two fish were measured at 260 millimeters (10 inches) and 360 millimeters (14 inches), all others were less than 210 millimeters (8 inches) in length (Buchanan *et al.* 1997). In the 1999 and 2000 surveys of Clear Creek, eight redds were observed each year (Malheur National Forest 2001).

Bull trout in the Middle Fork John Day River persist at low abundance levels. In 1999, population surveys were conducted in Clear Creek, Big Creek, Deadwood Creek, and Granite Boulder Creek to estimate abundance. Total numbers of bull trout consisting of primarily juvenile and subadult fish, were estimated to be 1,950 individuals in Big Creek, 640 individuals in Clear Creek, and 368 individuals in Granite Boulder Creek (Hemmingsen 1999).

Upper Mainstem John Day River. Based on distribution information contained in Buchanan *et al.* (1997), and professional judgement of the John Day River Recovery Unit Team, two bull trout local populations were identified in the upper mainstem John Day River. The upper John Day River local population includes Deardorff Creek, Reynolds Creek, Rail Creek, Roberts Creek, and Call Creek) and the Indian Creek local population occurs above the flow barrier (Buchanan *et al.* 1997).

Spawning surveys of bull trout habitat in tributary streams to the mainstem John Day River showed few fish spawning in the stream. The 1999 and 2000 surveys were done on portions of Call Creek, Deardorff Creek, John Day River, Rail Creek, Reynolds Creek, and Roberts Creek. Only Deardorff Creek was surveyed for 2 consecutive years. The number of redds observed in Deardorff Creek was 12 the first year and 10 the second year (Malheur National Forest 2001). Total numbers of redds from the first to second year is not comparable for the other streams surveyed (Table 1).

Table 1. Number of redds observed during 1999 and 2000 in upper John Day River, Oregon, during spawning surveys (N/S = not surveyed).

Stream	1999	2000
Call Creek	N/S	28
Deardorff Creek	12	10
John Day River	N/S	27
Rail Creek	N/S	18
Reynolds Creek	3	N/S
Roberts Creek	N/S	16

Within the upper John Day River and tributaries, 10-year average irrigation bypass trap count information from the upper mainstem, Reynolds, Deardorff, and Roberts creeks, indicate a decline from 152 bull trout between 1971 and 1980 to 95 from 1981 to 1992, or a 37.5 percent reduction (Claire and Gray 1993). The Oregon Department of Fish and Wildlife (1995) reported that 1990 surveys estimate that the upper mainstem, and Call and Rail creeks may have more than 300 total spawning adults.

Inventory data indicates distribution has been reduced by 55 percent from historical (Claire and Gray 1993) and bull trout are considered to be at moderate risk of extinction in the mainstem and tributaries (Ratliff and Howell 1992; Buchanan *et al.* 1997).

Aquatic inventory information collected from 1990 through 1992 indicates that summer distribution of bull trout is limited to about 25 percent of the stream area where bull trout were historically present (104 kilometers (65 miles) occupied out of 428 kilometers (266 miles) of previously estimated bull trout habitat), based on prior information on species presence (Buchanan *et al.* 1997). Creel survey information for the John Day River drainage indicates a reduction in the percentage of bull trout taken versus other trout species from approximately 22 percent during the period from 1961 to 1970 to 4.5 percent from 1981 to 1992 (Claire and Gray 1993).

Streams inventoried in 1990 revealed limited amounts of summer habitat in the mainstem. Survey crews in 1990 were unable to find bull trout in Roberts Creek, but bull trout were documented in the water diversion trap in Roberts Creek in 1990, 1991, and 1992, finding 39, 26, and 52 bull trout respectively in the bypass trap. Crews

conducting cutthroat surveys on August 25, 1997, documented bull trout in Roberts Creek, North Fork Reynolds Creek, and Deardorff Creek (Oregon Department of Fish and Wildlife 1997). A radio telemetry study of bull trout movements in the John Day River detected movement or individuals from headwater streams extending downstream to the town of John Day (Hemmingsen *et al.* 2001a).

The Malheur National Forest (1998a and 1999) provides detailed descriptions of baseline habitat conditions, and additionally list Crescent Creek, Graham Creek and Mossy Gulch as currently, occupied bull trout habitat. Historical records indicate presence of bull trout in Dads Creek, Dixie Creek, Pine Creek, Canyon Creek, Laycock Creek, and Beech Creek (Buchanan *et al.* 1997). Resident (summer distribution) bull trout currently occupy approximately 77 kilometers (48 miles) of stream in the upper mainstem John Day River (Malheur National Forest 1998a and 1999).

Mainstem John Day River. Recent survey work by the Oregon Department of Fish and Wildlife (Hemmingsen *et al.* 2001b) detected bull trout in the mainstem John Day River at River kilometer 273 (River Mile 170) near the town of Spray, downstream of the confluence with the North Fork John Day River at River kilometer 295 (River Mile 183). Two bull trout were radio tagged and tracked upstream during the summer. One bull trout was tracked to River kilometer 107 (River Mile 66) of the North Fork John Day River. It had traveled about 181 kilometers (112 miles) upstream during a period of 77 days. The second bull trout traveled about 220 kilometers (137 miles) upstream to River kilometer 6.1 (River Mile 3.8) in Granite Creek, a tributary to the North Fork John Day River (Hemmingsen *et al.* 2001b). Presence of bull trout below the confluence of the two tributaries is an indication the local bull trout populations of the North Fork and Middle Fork may be connected via seasonal migration between these two subbasins and that the mainstem may serve as bull trout overwintering and migration habitat.

In 2000, the Oregon Department of Fish and Wildlife captured 11 bull trout in the mainstem John Day River near the town of Spray, Oregon, while seining for juvenile chinook salmon. Two of the fish were implanted with radios and both were subsequently tracked into the North Fork John Day River. One was tracked upstream

to Granite Creek , and the second was tracked as far as Texas Bar Creek, although it may not have gone that far on its own. The radio tag was found at the base of a tree containing an osprey nest. One of the fish tagged was 234 millimeters (9.2 inches), the other was 248 millimeters (9.7 inches) long (Hemmingsen *et al.* 2001b).

REASONS FOR BULL TROUT DECLINE

According to the Northwest Power Planning Council (2001) two overriding factors influencing fisheries and fish habitat are that past, recent, and current land use practices are responsible for altering, at the landscape level, "the storage, movement and character of water resources over entire areas of the John Day River subbasin and its tributary system," and these prevalent land uses in combination with altered hydrologic responses are translated into stream channel instability in many area streams. Degraded fish habitat conditions are identified as occurring in approximately 966 kilometers (600 miles) of stream, due to erosion and sedimentation which reduce pool habitat, alter hydrographs, and result in loss of instream habitat elements (Northwest Power Planning Council 2001). Although a variety of factors are at play in each of the major stream segments (south, north, middle, and upper mainstem), the results have been similar across the basin.

Claire and Gray (1993) demonstrate these conditions for the North Fork John Day River reporting that the North Fork has the most bull trout habitat of the three John Day River subbasins, but note many areas are still affected by mining, logging, grazing, and road building. They list bull trout spawning and rearing habitat in the North Fork as highly vulnerable, due to water temperature increases from destruction of cold water springs, riparian habitat loss, and loss of instream structure and gravel. Buchanan *et al.* (1997) indicates other limiting factors including: (1) chemical mine waste, (2) reduction in anadromous fish populations, (3) past opportunities for over-harvest and poaching, and (4) hybridization and competition with brook trout.

Key habitat and population elements identified in Middle Fork John Day River subbasin biological assessments, of concern to bull trout, include isolated populations, high summer water temperatures, substrate embeddedness, and high road densities (Malheur National Forest 1999a, 1998a and b).

Numerous habitat and population elements of concern to bull trout were identified in the upper mainstem John Day River biological assessments, especially when individual, occupied subwatersheds were reviewed (Malheur National Forest 1999a). Overall, habitat conditions detrimental to bull trout include high summerwater

temperatures, high sediment concentrations, substrate embeddedness, and poor bank stability.

Dams

There are no major hydropower dams located in the John Day River basin (Oregon Department of Agriculture 2002). Anadromous fish access to the John Day River basin is constrained by passage through the three mainstem Columbia River Dams: Bonneville, The Dalles, and John Day. Bull trout use of the mainstem Columbia in the vicinity of these dams is not well documented, and obtaining additional use information is identified as a term and condition in the U.S. Fish and Wildlife Service's Biological Opinion on operation of the Federal Columbia River Power System (U.S. Fish and Wildlife Service 2000). At a minimum, limiting production of anadromous fish in the John Day River basin has a negative effect on stream productivity due to the loss of nutrients imported by the anadromous fish. This resource loss affects bull trout in the John Day River basin by the direct loss of potential prey, as well as limiting the productive capacity of area streams for other fish and invertebrate prey species. Known water storage in the basin as of 1986 is indicated as occurring in 478 permitted reservoirs ranging from 123.4 cubic meters (0.1 acre feet) to 2,837,050 cubic meters (2,300 acre feet), with only 22 greater than 61,675 cubic meters (50 acre feet) in size (Oregon Water Resources Department 1986). Many locations in the John Day River and its tributaries are seasonally dammed (push-up dams) for irrigation purposes, as described below in the agricultural section.

Forest Management Practices

Approximately 30 percent of the John Day River basin is managed by the U.S. Forest Service, with most of the remaining 60 percent being privately owned (Northwest Power Planning Council 2001). As rail lines were expanded into the rural west, including the Blue Mountains, timber extraction followed, and, as cited in Robbins and Wolf (1994), "timber was taken from each gulch and creek along the way." With rail access came the additional opportunity to transport wood to distant markets, leading to large-scale harvest of the ponderosa pine forests and industrial lumber production (Robbins and Wolf 1994). According to the Oregon Water Resources Department

(1986), large volumes of trees were harvested from private lands within the basin as of 1986, and harvest attention was expected to turn toward public lands, as most private stands had been exhausted.

Fire suppression policies and land management practices have affected both the composition and structure of forest stands in the basin (Malheur National Forest 1998a and 1999b). With the use of early detection and suppression methods over the last 40 years, fire cycles and periodicity has resulted in alteration of the forest vegetation communities (Umatilla National Forest 1997). Without periodic low or moderate intensity fires, stand densities tend to increase and tree species composition shifts to favor the more shade-tolerant trees (Umatilla National Forest 1997). Fire suppression results in reducing the frequency of "low intensity" fires since the early 1900's when fire suppression became a top priority for resource managers.

In addition to the fire suppression program, timber harvesting has played a significant role in the current vegetative composition outside of designated wilderness. Emphasizing forest management for timber extraction dates back to the early 1900's, although, to supply local demand, the first sawmills quickly followed the discovery of gold in the John Day valley in 1862 (Robbins and Wolf 1994). The practice of removing large diameter, fire-tolerant trees, and the subsequent management of the faster growing fir tree species resulted in dense stands of trees that are more susceptible to larger fires and less conducive to the more frequent low intensity fires (Umatilla National Forest 1997, Malheur National Forest 1998a). The increase in large fires can be attributed to both weather conditions that followed the fire starts, along with the type of fuels (Malheur National Forest 1999b). Lightning fires that burned the area also affected bull trout habitat, indirectly increasing sedimentation and water temperatures by loss of ground covering vegetation (Buchanan *et al.* 1997). According to Wissmar *et al.* (1994), the riparian canopy is completely gone in many parts of the John Day River basin, due to poor livestock and forestry practices.

Throughout the John Day River basin, logging practices have directly and indirectly affected fish and aquatic resources, and degraded water quality (Oregon Department of Fish and Wildlife 1990). Forest management practices can affect stream systems in a variety of ways. In the John Day River basin, impacts include increased sedimentation from ground disturbing activities, the road system (specific road-related

impacts will follow in the transportation section), and fire-related sedimentation (from runoff over bare ground following fires); the immediate loss of large wood from stream channels, and loss of future wood recruitment due to riparian harvest, especially on private land (due to the less stringent requirements imposed by the State Forest Practices Act relative to Federal standards); increased stream temperatures due to the loss of streamside shade; impaired stream bank stability due to the loss of root structure from riparian harvest and site preparation activities; passage barriers due to road crossings and impassable culverts; and altered hydrologic patterns due to changes in the frequency, timing, magnitude, and spatial distribution of peak, high, and base flows (see for example Meehan 1991; U.S. Department of Agriculture and U.S. Department of the Interior 1994; Spence *et al.* 1996; Lee *et al*. 1997). Further, historic forest management practices have shifted forest composition from lodgepole pine to white fir as the dominate overstory in some areas of the forest and from ponderosa pine to douglas fir in other areas (Oregon Department of Fish and Wildlife (ODFW) *in litt*. 2000). This management legacy will take decades to correct (see, for example, U.S. Department of Agriculture and U.S. Department of the Interior 1994).

North Fork John Day River. According to the Umatilla National Forest (1999), integrity ratings for the North Fork John Day River subbasin were low for forest conditions, and low for overall ecological integrity. Late and old structure forest stands are not well represented in the North Fork John Day River subbasin, due primarily to harvest and large wildfires (ODFW, *in litt*. 2000; Umatilla and Wallowa Whitman National Forest 1997a and 1997b). Outside the North Fork John Day Wilderness Area, road construction to support harvest activities has resulted in high road densities with many stream crossings. Fish habitat has been affected through high water temperatures due to a lack of streamside shade, increased amounts of fine sediments, altered hydrologic patterns, lost pool habitat, and low amounts of instream woody structure (Umatilla National Forest and Wallowa Whitman National Forest 1997a and 1997b).

Middle Fork John Day River. High road densities, (Malheur National Forest 1998a) and large acreage wild fires in the Middle Fork John Day River basin (Summit Fire 1996) have contributed to altered stream hydrology and increased sediment delivery to streams especially spawning and rearing areas (ODFW, *in litt.* 2000). With the exception of Clear Creek and Lunch Creek, the amount of large wood, in streams and stream pool depths have been reduced in many reaches due to past harvest, railroad, and road building activities (Malheur National Forest 1998a). The Oregon Department of Environmental Quality (1998) has identified most tributaries in the Middle Fork John Day River subbasin as water quality limited, primarily due to high stream temperatures. In the Granite Boulder Creek subwatershed, approximately 60 percent of the area has been altered by timber harvest activity (Malheur National Forest 1998a).

Upper Mainstem John Day River. Commercial timber harvest of area forests began in the 1950's and focused on removing larger overstory fire-tolerant trees such as ponderosa pine (Malheur National Forest 1999a). The upper mainstem exhibits a checkerboard public/private (alternate section) ownership pattern that does not facilitate good watershed management, and in recent years most of the privately owned lands have been selectively cut (Malheur 1999a; ODFW, *in litt.* 2000). Steep slope logging began in the 1970's and continued through the 1990's (Malheur National Forest 1999a). Use of ground based logging equipment on steep (greater than 30 percent) slopes and high road densities contribute sediment to bull trout spawning and rearing areas (ODFW, *in litt.* 2000). This logging method has been used extensively in the upper John Day River drainage (ODFW, *in litt.* 2000). Fires such as the Wildcat Fire, have also increased sediment loading in the mainstem John Day River (ODFW, *in litt.* 2000). Increased stream temperatures and sediment delivery, and loss of large pools, in part from past and ongoing forest management activity are the main factors limiting bull trout productivity in this area.

Livestock Grazing

Historic, and to a lesser degree, current grazing practices have removed extensive amounts of riparian vegetation that help stabilize stream channels and provide essential shade and cover to streams throughout the entire basin (ODFW, *in litt*. 2000). In many

areas native bunch grasses have been replaced with invasive nonnative vegetation such as cheat grass and medusa head wild rye (ODFW, *in litt*. 2000). These nonnative grasses are more susceptible to frequent fires and retard the growth of native species by reducing the amount of water available during critical growing periods (ODFW, *in litt*. 2000). Present grazing on National Forest System land varies in use, with little consistency in compliance with current grazing standards. Several areas lack adequate riparian vegetation and shrubs necessary to prevent bank erosion and heating of water. The absence of shrubs and deciduous trees in meadows has been attributed to summer long grazing.

High intensity livestock grazing and agricultural development has contributed to aquatic habitat degradation. Local areas may experience concentrations of livestock sufficient to damage streambanks and degrade habitat quality (ODFW, *in litt*. 2000). Grazing on private land varies widely, but often times shows ongoing stream bank damage from livestock (ODFW, *in litt*. 2000).

North Fork John Day River. As in most other areas in the west, there was historically a much higher intensity of livestock grazing in the past over much of the North Fork John Day River drainage, which no doubt contributed to aquatic habitat degradation (Umatilla National Forest, *in litt.* 2000). Severely damaged riparian areas, attributible to livestock grazing occur in the lower North Fork John Day River tributaries, and Camas Creek, a tributary to the upper North Fork John Day River (Oregon Department of Fish and Wildlife 1990). Current grazing on National Forest land is much lighter, but localized areas may experience concentrations of livestock sufficient to damage streambanks and degrade habitat quality (Umatilla National Forest, *in litt.* 2000). Grazing on private land varies widely, but lower Camas and Owens creeks show ongoing stream bank damage from livestock (Umatilla National Forest, *in litt.* 2000).

Middle Fork John Day River. Livestock grazing occurs over much of the area along the Middle Fork John Day River and its tributaries, and during the hot season, livestock tend to congregate near water sources, often leading to damaged riparian zones. This is particularly true on private lands adjacent to the river and tributaries where livestock are allowed to graze during summer and fall months. Several areas of the

Middle Fork John Day River lack adequate riparian vegetation and shrubs necessary to prevent bank erosion and heating of water (ODFW, *in litt*. 2000). The absence of shrubs and deciduous trees in meadows along the upper reaches of the Middle Fork has been attributed to summer long grazing (ODFW, *in litt*. 2000).

Upper Mainstem John Day River. Although livestock grazing practices on public lands have improved in recent years, some sites continue to be problem areas (Oregon Department of Fish and Wildlife *in litt*. 2000). According to the Malheur National Forest (1999a), negative effects of livestock grazing are particularly evident near water sources, and degraded riparian conditions are of great concern. The Deardorff, Hot Springs, Rail Creek and Reynolds Creek livestock grazing allotments contain streams inhabited by bull trout in the upper John Day River (Malheur National Forest 1999a). Streams with suspected or potential distribution occur in the Dixie and Indian creek allotments (Malheur National Forest 1999a).

Agricultural Practices

Agriculture production, primarily hay, grain crops and fruit orchards, is one of the main economic activities in the John Day River basin (Northwest Power Planning Council 2001). Agricultural practices have contributed to degraded stream and riparian conditions throughout the basin. Draining and conversion of wetlands to pastures, diking and channelizing of streams, and removal of extensive beaver colonies and large trees in the riparian corridor have all had a negative effect on the river's interaction with its floodplain (Oregon Department of Fish and Wildlife *in litt*. 2000). Irrigation withdrawals decrease streamflow during the summer when water temperature increases to critical levels and widespread flood irrigation return flows in the middle fork and mainstem subbasins return warmed water to the river (Oregon Department of Fish and Wildlife *in litt*. 2000). Cumulatively, warm return flow combined with decreased instream flow has significantly altered the temperature regime of area streams and rivers (Oregon Department of Fish and Wildlife *in litt*. 2000). Attempts to armor riverbanks to prevent erosion have also simplified the river channel and reduced habitat diversity (Oregon Department of Fish and Wildlife *in litt*. 2000).

A high number of "push up dams" are used within migratory bull trout habitat (Northwest Power Planning Council 2001). "Push up dams" are created by using a bulldozer to pile stream substrate across the stream and divert water into an irrigation ditch. Some of these temporary dams result in intermittent passage, and interrelated impacts such as sedimentation, reduced flows and associated water quality impacts (Northwest Power Planning Council 2001). Although participation in the screening program is extensive, there still remain 30 legal diversions which are unscreened and 228 existing screens that do not meet current screen criteria (Northwest Power Planning Council 2001). The Oregon Department of Fish and Wildlife currently performs operation and maintenance on 314 screens in the John Day River basin (Northwest Power Planning Council 2001). Elevated water temperature and reduced stream flow due to water diversions in the mainstem river and larger tributaries acts as a barrier to migration during summer and early fall (Buchanan *et al.* 1997), isolating local populations.

North Fork John Day River. Irrigation water rights for the North Fork John Day River subbasin total 8.3 cubic meters persecond (291.5 cubic feet persecond), and are used to irrigate a total of 5,423 hectares (13,400 acres), mostly by sprinkler (Oregon Department of Agriculture 2002). The Pete Man Ditch diverts most of the West Fork Clear Creek and virtually all of Salmon and Lightning creeks before continuing on to the North Fork Burnt River. The Pete Man Ditch also partially dewaters East Fork Clear Creek, Dry Creek, Spring Creek, and Lightning Creek, all of which contain bull trout (Oregon Department of Fish and Wildlife *in litt*. 2000, Umatilla National Forest *in litt*. 2000). Although most of the water right is for mining use, the portion that is delivered to the Burnt River basin is used to irrigate agricultural crops, primarily hay (Oregon Department of Fish and Wildlife *in litt*. 2000).

Middle Fork John Day River. Irrigation water rights for the Middle Fork John Day River subbasin total 2.5 cubic meters persecond (88.5 cubic feet persecond), with most water delivered through flood irrigation to 1,983 hectares (4,900 acres) near Long Creek and above Galena (Oregon Department of Agriculture 2002). The total amount of cropland in the Middle Fork John Day River subbasin is approximately 4,290 hectares (10,600 acres) with alfalfa, meadow and grass hay, pasture, grain, and grain hay the

principle crops (Oregon Department of Agriculture 2002). The Oregon Department of Environmental Quality (1998) identified all streams inhabited by bull trout in the middle fork system (Middle Fork John Day River, Big Creek, Granite Boulder Creek, and Clear Creek) as water quality limited, primarily for high summer temperatures, but also flow modification of the middle fork. Although not solely the result of agricultural practices (forestry, livestock grazing, and the transportation network are also implicated), agriculture, and particularly irrigated agriculture is implicated. High water temperatures in the middle fork are a factor contributing to isolating bull trout local populations in the middle fork subbasin (Oregon Department of Fish and Wildlife *in litt*. 2000). Potential habitat is also limited by irrigation structures. For example, Bridge Creek is adjacent to Clear Creek (currently inhabited) and could provide about 11 miles of high quality habitat with good water quality that could be recolonized by bull trout (Oregon Department of Fish and Wildlife *in litt*. 2000). Access to Bridge Creek is blocked by a 4.5 meter-high (15 foot) dam, and plans are underway to either remove the dam or provide fish passage over it (Oregon Department of Fish and Wildlife *in litt*. 2000).

Upper Mainstem John Day River. Over 90 percent of the total appropriated water volume in the upper mainstem subbasin is allocated to irrigation (Oregon Water Resources Department 1986). Water rights for irrigation use total 26 cubic meters-persecond (927 cubic feet-persecond) and are applied primarily by flood irrigation, with greater use of sprinklers below the town of Mt. Vernon, Oregon (Oregon Water Resources Department 1986). Over 80 ditches divert water from the mainstem river, including three major ditches (Oregon Water Resources Department 1986). The total amount of cropland in 1986 was 10,643 hectares (26,300 acres), with the majority, 10,117 hectares (25,000 acres), being irrigated (Oregon Water Resources Department 1986). Streams currently occupied, historically occupied, or that are potential habitat for bull trout, are affected by agricultural activities in the upper mainstem. Indian Creek, currently inhabited by a small population of bull trout above the Strawberry Wilderness boundary, has virtually no flow during part of each summer, which seasonally isolates the local population (Oregon Department of Fish and Wildlife *in litt*. 2000). Irrigation withdrawals completely dry Pine Creek, a historic bull trout stream, for several miles each summer (Oregon Department of Fish and Wildlife *in litt*. 2000). Strawberry Creek, which contains core bull trout habitat, has passage problems attributable to multiple diversions with inadequate jump pools or the presence of concrete aprons (Oregon

Department of Fish and Wildlife *in litt*. 2000). This stream is inadequately screened, has multiple channels once it leaves National Forest land, and one of the diversions intercepts the main channel blocking all upstream passage (Oregon Department of Fish and Wildlife *in litt*. 2000). The Oregon Department of Environmental Quality (1998) indicates that the upper mainstem is water quality limited due to high bacterial concentrations, low dissolved oxygen, modified stream flow, and high summer temperature. Both inhabited (Rail, Reynolds, and Indian creeks) and core habitat (Pine and Strawberry creeks) streams are listed as water quality impaired due to high summer temperatures (Oregon Department of Environmental Quality 1998).

Transportation Network

As with many stream systems throughout the Pacific Northwest and the country, extensive road networks may parallel existing stream channels imposing a variety of impacts. A partial list includes increasing sediment loading from runoff over gravel or native surface roads, intercepting surface and shallow subsurface water flow and altering runoff patterns, constraining stream channels from normal movement and adjustment patterns, interacting hydrologically with the stream network, and acting as a conveyance for introduction of nonnative species, poachers, and toxic substances via spill during transport. Landscape analysis correlating road density to the status of four nonanadromous salmonids indicated that road densities had a strong negative correlation with the status of the particular salmonid species (Lee *et al.* 1997). According to Lee *et al*. (1997) bull trout were generally found to be absent where geometric mean road densities were greater than or equal to 0.7 kilometers per square kilometer (1.13 miles per square mile) and the arithmetic mean road density of all upstream subwatersheds was 1.06 kilometers per square kilometer (1.71 miles per square mile). No attempt was made by Lee *et al*. (1997) to establish the causal mechanisms for the observed relationships, due to the large number of pathways for impact to aquatic species and habitat from road construction and use.

North Fork John Day River. Road densities, the number of stream crossings, and the amount of road within the riparian habitat conservation area are generally quite

high on Federally managed lands in North Fork John Day River subbasin, with the exception of wilderness areas. As stated above, there are many causal mechanisms for the negative relationship between road density and the health of salmonid populations, and in some cases, a relatively small overall length of road can be responsible for most of the observed impact. In the North Fork John Day River watershed, where roads were present in the non-wilderness portion of the subwatersheds, (7 out of 9 subwatersheds with 1 missing data), road densities ranged from 1.9 to 4.2 kilometers per square kilometer (3.0 to 6.7 miles per square mile). Miles of road within the riparian habitat conservation area range from zero to 13, and in some cases occur in 71 percent of the riparian habitat conservation areas adjacent to fish bearing streams, with up to 61 stream crossings (Umatilla and Wallowa Whitman National Forests 1997a). Data from the Granite Watershed indicate that road-related problems are likely more extensive, with non-wilderness road densities ranging from 0.2 to 4.9 kilometers per square kilometer (0.4 to 7.09 miles per square mile), with, in some subwatersheds, the length of road in riparian habitat conservation areas over double that of fish bearing streams, and up to 135 observed stream crossings (Umatilla and Wallowa Whitman National Forests 1997b).

Illustrating another threat from the road system, an estimated 3,500 gallons of hydrochloric acid spilled from a tanker truck into the North Fork John Day River at the confluence with Camas Creek at River kilometer 91.4, (River Mile 56.8) in 1990 (U.S. Fish and Wildlife Service 1994). The spill killed an estimated 98,000 to 145,000 fish including 4,000 anadromous fish, 300 bull trout, and 9,500 lamprey within a 19-kilometer (12 mile) reach of the North Fork John Day River (U.S. Fish and Wildlife Service 1994). Modeling suggested pH changes may have extended for 66.8 kilometers (41.5 miles) before being diluted and neutralized to a pH of 6.5 (U.S. Fish and Wildlife Service 1994).

Middle Fork John Day River. According to the Oregon Department of Fish and Wildlife *in litt*. (2000) highways 26 and 7 cross or follow parts of the Middle Fork John Day River, and culverts on Clear Creek and the middle fork could be either replaced with bridges, or with culverts that are more fish passage friendly. Many of the roads on Federal lands were built to support timber harvest, mining and grazing, and have led to a substantial network of roads throughout the area (Malheur National Forest

1998a). Road densities in roaded areas within the subwatersheds supporting bull trout range from 1.5 to 3.5 kilometers per square kilometer (2.4 to 5.7 miles per square mile), with approximately 20 percent of roads occurring in the riparian habitat conservation areas (Malheur National Forest 1999a and 1999b).

Upper Mainstem John Day River. A paved county and Forest Service road follows the upper mainstem with several crossings and placement that constrains the flood plain (Oregon Department of Fish and Wildlife *in litt*. 2000). Improved roads also make bull trout spawning and rearing areas more accessible to the public and increase susceptibility to overharvest, poaching, and harassment (Oregon Department of Fish and Wildlife *in litt*. 2000). Road densities and riparian road milage is expected to be comparable to that reported for the north and middle forks.

Mining

According to the Northwest Power Planning Council (2001), although reduced in frequency and intensity, mining still continues in the John Day River basin. Gold and locatable mineral mining occurs on the upper North and Middle Forks John Day River and tributaries to the upper mainstem John Day River (Northwest Power Planning Council 2001). Aggregate (rock and gravel) mining for road construction occurs throughout the basin (Northwest Power Planning Council 2001). Extensive gold mining throughout the upper mainstem and tributaries, the upper Middle Fork and tributaries, the North Fork between Desolation Creek and Big Creek and in the Granite Creek basin have greatly reduced habitat diversity and contributed to reduced water quality (Oregon Department of Fish and Wildlife *in litt*. 2000). Inadequate buffer strips between mining activity and streams, flooded settling basins during high flows, and the cumulative impact of numerous small recreational operations degrade habitat quality, removing shade, and large wood, displacing aquatic invertebrates, and destabilizing spawning gravels (Oregon Department of Fish and Wildlife *in litt*. 2000). According to the Oregon Department of Fish and Wildlife (*in litt*. 2000) gold dredges operated in the three major basins up until the 1940's.

North Fork John Day River. Presently, water rights for 5.7 cubic meters persecond (202 cubic feet persecond) are identified in the North Fork to support mining activities in the subbasin (Oregon Department of Agriculture 2002). According to the Umatilla National Forest (1999) 661 claims are filed within the boundaries of the North Fork John Day Ranger District, but only about 40 claims have the necessary approval to actually extract minerals. Both active and inactive claims are present in the Desolation Creek watershed, with one active and three abandoned mines located within the watershed, and substantial levels of activity noted on private lands (Umatilla National Forest 1999). There are 50+ mining claims in the Granite Creek System on the Umatilla National Forest and a larger number on the Wallowa Whitman National Forest (Umatilla National Forest *in litt*. 2000). Shaft mining in the Granite Creek system has, in some cases, produced a mine shaft effluent high in iron, which precipitates as the oxide, coating the stream substrate with a fine orange flocculent precipitate (Umatilla National Forest *in litt*. 2000). The Red Boy Mine affects water quality in Clear Creek from heavy metals leaching out of the mine adit (Oregon Department of Fish and Wildlife *in litt*. 2000). Boulder Creek, a tributary inhabited by bull trout in the Granite Creek watershed, has a dewatered section which isolates it due to past mining activities (John Day River Recovery Unit Team *in litt*. 2001). Lightning and Salmon creeks, in the Granite Creek watershed, are negatively affected by the Pete Mann mining ditch. The ditch diverts water from Granite Creek to the Burnt River watershed, and impedes bull trout movement upstream (Umatilla and Wallowa Whitman National Forests 1997b, Oregon Department of Fish and Wildlife *in litt*. 2000). The Crane Creek stream channel is currently dominated by historic and current mining impacts (Umatilla and Wallowa Whitman National Forests 1997a). Past placer mining throughout the North Fork John Day River subbasin has flushed fine sediment into area streams (Umatilla National Forest *in litt*. 2000).

Extensive dredge mining on the North Fork John Day River and in the Granite and Clear creek system in the 1950's and 1960's drastically altered the stream channel, effectively channelizing the stream and restricting its access to the flood plain (Umatilla National Forest *in litt*. 2000). Mining activities are indicated as ongoing in Desolation Creek. One active lode mine and three inactive placer mines are located on Federal lands, and other lode and placer mines occur on private lands in the watershed (Umatilla National Forest 1999). The Oregon Department of Environmental Quality (1998), has

identified habitat modification as a parameter limiting beneficial water uses in the North Fork John Day River. Streams indicated as water quality limited due to habitat modification are Baldy, Crane, Crawfish, Trail, North Fork.Trail, South Fork Trail, Bull Run, Boulder, and Granite creeks and the North Fork John Day River, from its mouth to the headwaters (Oregon Department of Environmental Quality 1998).

Middle Fork John Day River. Existing water rights for mining in the Middle Fork John Day River subbasin total 1.4 cubic meters per second (49.5 cubic feet per second), and are generally dated later than 1970 (Oregon Department of Agriculture 2002). According to the Malheur National Forest (1998a), lode mining in the Middle Fork occurs in the upper watershed, and many areas in the Middle Fork John Day River have been dredged or placer mined. Mining activity is relatively minimal at present, but the Middle Fork has some of the highest amount of mining activity on the Malheur National Forest (Malheur National Forest 1999b). Currently there is one vertical mine shaft and several mine adits that are open, and old ore processing facilities still exist in the Middle Fork area (Malheur National Forest 1999b). In the Granite Boulder subwatershed, hand-dredging streams involved lifting and washing stream rocks by hand and stacking them in the adjacent floodplain or terraces, removing the majority of the larger stream substrate from the channels in Elk, Deep, Big, Placer Gulch, Davis, Vinegar, and Vincent creeks (Malheur National Forest 1999b).

Upper Mainstem John Day River. Mining activity in the upper mainstem John Day River was extensive in the past, and included large scale dredging of the upper John Day River and lode mines in the Canyon Creek watershed and above Praire City (Oregon Water Resources Department 1986). Although active claims exist in a number of tributaries, the majority of current activity consists of small scale placer mining along area streams, such as Canyon Creek (Oregon Water Resources Department 1986). According to the Malheur National Forest (1999a) there are no active mining operations in the upper mainstem, and recreational mining has not been observed for the last 5 years.

Residential Development

The John Day River basin is sparsely populated, with a human population density ranging from 2.3 to 5.6 people per square kilometer (0.9 to 2.2 people per square mile) and urban lands comprising 0.3 percent of the basin (Northwest Power Planning Council 2001). There are several towns in the basin with populations varying from 138 at Dayville to 1,821 for the town of John Day in the year 2000. Given these statistics, residential development in a relative sense, is not an appreciable factor in bull trout decline.

The sewage treatment plant at Prairie City has issued public health alerts regarding raw sewage entering the John Day River on several occasions during high stream flows in late winter or early spring (Oregon Department of Fish and Wildlife *in litt*. 2000). According to the Oregon Department of Fish and Wildlife (1990), problems with individual septic systems also exist within the basin, but bacterial and nutrient pollution from residential sources do not pose a significant problem for fisheries resources within the basin. The upper North Fork John Day River, from the north fork confluence to Reynolds Creek, is identified as water quality limited, year-long, due to high bacteria concentrations (Oregon Department of Environmental Quality 1998).

Recreation

The John Day River subbasin offers a variety of recreational opportunities, from wilderness hiking and camping in wilderness areas (North Fork John Day River, Strawberry, Black Canyon, and Bridge Creek), to Federal Wild and Scenic Rivers and State Scenic Waterways, and the John Day Fossil Beds National Monument (Northwest Power Planning Council 2001). Recreation activities include hunting, fishing, hiking, cross country skiing, snowshoeing, camping, horseback riding, all terrain vehicle riding, mushroom and berry picking, horn hunting, rock hounding, firewood and post and pole cutting, and driving for pleasure. Both developed and undeveloped camping facilities are present. Impacts to bull trout habitat from recreational activities include increased sediment delivery to streams from road and trail use, disturbed stream beds and banks from vegetation removal at camp sites and local recreation use, introduction of noxious

weeds from feed for stock animals or vehicles, increased opportunity for poaching, and potential introduction of nonnative fishes. Recreational activity can occur locally at high levels, especially during the fall big game hunting.

North Fork John Day River. The upper North Fork John Day River is a popular recreation area, with heavy use in summer and fall and relatively low amounts of winter use due to limited vehicle access under winter weather condition (Umatilla and Wallowa Whitman National Forests 1997a). The North Fork John Day River, from its headwaters to the Camas Creek confluence was designated as a National Wild and Scenic River in 1988 (Bureau of Land Management 1999). Recreation activities include camping, hunting, fishing, hiking, picnicking, cross-country skiing, snowshoeing, horseback riding, snowmobiling, all-terrain vehicle use, driving for pleasure, and gold panning (Umatilla and Wallowa Whitman National Forests 1997b). This area is heavily utilized by big game hunters during the fall (Umatilla and Wallowa Whitman National Forests 1997a).

Recreation facilities in the North Fork John Day River watershed are at a limited level of development (primitive) and include one campground, seven trailheads, and seven trails accessing both units of the North Fork John Day Wilderness (Umatilla and Wallowa Whitman National Forests 1997a). Wilderness trails follow the North Fork John Day River and do not appear to adversely affect stream habitat; however, the potential for unlawful harvest of bull trout exists due to the proximity of these trails to the North Fork John Day River and Baldy Creeks especially during the fall spawning season (Umatilla and Wallowa Whitman National Forest 1997a). In September of 1999, the remains of a large female bull trout were found in Baldy Creek, immediately adjacent to the existing trail (John Day River Recovery Unit Team *in litt*. 2001). The U.S. Forest Service was unable to determine who had poached the fish (John Day River Recovery Unit Team *in litt*. 2001).

Middle Fork John Day River. According to the Malheur National Forest (1999b) recreation use in the Middle Fork John Day River watershed is gradually increasing and activities extend throughout the year. Along the Middle Fork John Day River, campgrounds and streams receive moderate to heavy continuous use, especially

during big game hunting seasons (Malheur National Forest 1999b). Recreation facilities include three Forest Service developed campgrounds and 93 kilometers (58 miles) of trails that are open to hikers, cyclists, and horseback riders. About 19 kilometers (12 miles) of the 93 are open to motorcycles and offroad vehicles, and approximately 24 kilometers (15 miles) are designated snowmobile trails (Malheur National Forest 1999b). Dispersed campsites generally lack features present in developed campgrounds, may only have toilets and fire rings, and are generally located on flat terrain off main travel routes, near water (Malheur National Forest 1999). The Malheur National Forest (1999b) notes impacts occur to aquatic habitat through damage to vegetation and riparian zones from camping activity, vehicles, and sanitation practices.

Upper Mainstem John Day River. There are a variety of recreation facilities in the upper John Day River, both wilderness and non wilderness. According to the Malheur National Forest (1999a) there are five developed campgrounds encompassing approximately 20 hectares (49.5 acres) and located within 30 meters (100 feet) of the John Day River and Strawberry Creek. Existing trails are of four different types: wilderness (50 kilometers or 31 miles), non wilderness (13 kilometers or 8 miles), snowmobile (35 kilometers or 22 miles), and bicycle (67 kilometers or 42 miles). Many trails are dual purpose (Malheur National Forest 1999a). Seven trailheads are located on U.S. Forest Service-managed lands in the upper John Day River basin, with capacities ranging from 2 or 3 to 15 passenger vehicles (Malheur National Forest 1999a). Dispersed campsites are located within and outside of wilderness, with half of the wilderness sites occurring at Strawberry Lake (Malheur National Forest 1999a).

Fisheries Management

Historical descriptions portray the John Day River as a stable and productive river with good summer flows, high water quality, and heavy riparian cover (Oregon Department of Fish and Wildlife 1990). The Peter Skene Ogden journals support these claims, describing an abundance of beaver *(Castor canadensis)*, diverse riparian vegetation, and good stream flows (the party was unable to ford horses through the river in July near the present town of Prairie City) and channel structure (Oregon Department of Fish and Wildlife 1990). Large runs of spring and fall chinook salmon and numerous

beaver sightings indicate that the John Day River contained an abundance of diverse instream habitat for fish (Oregon Department of Fish and Wildlife 1990).

The John Day River remains a significant producer of anadromous fish in the Columbia River basin. Annual runs of 2,000 to 5,000 spring chinook salmon and 15,000 to 40,000 summer steelhead trout are estimated (Oregon Department of Fish and Wildlife 1990). Limits to distribution and abundance are generally attributed to high egg and smolt mortality resulting from degraded habitat within the John Day River basin and to high juvenile and adult mortality at the three Columbia River dams that migrating fish must pass to return to their natal streams (Oregon Department of Fish and Wildlife 1990). Reduced populations of anadromous fish represent a large loss of nutrient inputs and system productivity. The impacts to bull trout are both direct, in terms of direct loss of prey species (Oregon Department of Fish and Wildlife *in litt*. 2000), and indirect, in terms of reduced aquatic productivity.

Brook trout, introduced into the upper mainstem and North Fork drainages in the first half of the 20th century, have persisted to date (Oregon Department of Fish and Wildlife *in litt*. 2000). Several high lakes in current or historic bull trout habitat were stocked and now have self sustaining brook trout populations (Crawfish, Baldy, Slide, Little Slide, Strawberry, Little Strawberry, and Olive lakes)(Oregon Department of Fish and Wildlife *in litt*. 2000).

Harvest of bull trout was a problem in previous years because of high vulnerability to angling. However, recent regulation changes prohibiting take of bull trout appear to be working well (Oregon Department of Fish and Wildlife *in litt*. 2000).

Rotenone projects to rehabilitate headwater lakes and streams were historically common, however treatments were conducted at times and locations where it is very unlikely that bull trout were killed. Water temperatures where drip stations were placed were not suitable for bull trout survival (Oregon Department of Fish and Wildlife *in litt*. 2000). Following a 1982 Middle Fork rotenone treatment that was poorly executed, there have been no rotenone projects in the John Day River basin (Oregon Department of Fish and Wildlife *in litt*. 2000). However, previous rotenone projects may have locally

reduced the forage base for migratory bull trout (Oregon Department of Fish and Wildlife *in litt*. 2000).

There are no significant fish disease issues in the recovery unit at this time, bull trout may be resistant to some diseases that are more devastating to other salmonids. In challenge studies conducted by Oregon State University researchers, Metolius (Deschutes) bull trout exposed to high and low doses of the infectious stages of *Myxobolus cerebralis* (causative agent in whirling disease) showed no signs of infection as measured by presence of spores, clinical disease signs, or histopathology. Rainbow trout exposed simultaneously showed high infection prevalence and disease severity. Nor were infections detected in Metolius (Deschutes) bull trout exposed to infection by *Ceratamyosis shasta* (Bartholomew 2001). Disease studies conducted on bull trout from the Deschutes River basin, showed them to be relatively resistant to all strains of Infectious Hematopeietic Necrosis Virus tested. Bull trout had detectable levels of antigen to *R. salmoninarum* (bacterial kidney disease) but no evidence of the disease.

North Fork John Day River. Brook trout inhabit the North Fork drainage including Crawfish, Baldy, Slide, and Little Slide lakes (Oregon Department of Fish and Wildlife *in litt*. 2000). Most of the lakes are in drainages where bull trout are currently or historically were found. According to the Umatilla National Forest (*in litt*. 2000), strong populations of brook trout occur in North Fork John Day River tributaries (Winom and Big Creeks, Trout Creek, Crane Creek, Camas Creek tributaries Cable, Frazier, and Hidaway Creeks. Less robust brook trout populations occupy the mainstem and lower south fork of Desolation Creek, Lake Creek, upper East Fork Meadow Brook, (North Fork John Day River tributaries), and Wilson Creek a tributary to Wall Creek (Umatilla National Forest *in litt*. 2000). Bull trout brook trout hybrids have been found at several locations in the north fork (Claire and Gray 1993). Historic angling included targeting bull trout in the North Fork, but has since markedly diminished (Oregon Department of Fish and Wildlife *in litt*. 2000). Some poaching may occur, especially during the hunting season (John Day River Recovery Unit Team *in litt*. 2001)

Middle Fork John Day River. At present, there are no brook trout known to inhabit the Middle Fork or its tributaries, and no bull trout x brook trout hybrids have

been reported (Claire and Gray 1993). Angling effort in middle fork areas inhabited by bull trout is described as very low, attributable to the discontinued stocking of legal sized and fingerling trout (Oregon Department of Fish and Wildlife *in litt*. 2000)

Upper Mainstem John Day River. Historically, brook trout and hatchery rainbow trout stocking occurred on a limited basis in the upper subbasin (Oregon Department of Fish and Wildlife 1990). Steelhead were stocked on an experimental basis in the early 1960's, but stocking failed to establish a viable population (Oregon Department of Fish and Wildlife 1990). The upper John Day River is currently managed for natural fish production (Oregon Department of Fish and Wildlife 1990). A few specialized put-and-take fisheries continue to be implemented in ponds and lakes (*e.g.* Trout Farm Pond and Magone Lake), but angling effort in areas inhabited by bull trout is described as low (Oregon Department of Fish and Wildlife *in litt*. 2000).

Isolation and Habitat Fragmentation

The major isolating mechanism affecting bull trout local populations in the John Day River basin is seasonally inadequate water quality and quantity in themainstem river and tributaries, due to degraded riparian and stream habitat conditions. Other barriers include low head dams, diversions, and natural waterfalls (Claire and Gray 1993, Oregon Department of Fish and Wildlife *in litt*. 2000).

North Fork John Day River. Natural waterfalls on South Fork Desolation, East Meadowbrook, and Big creeks potentially isolate bull trout into separate local populations (Claire and Gray 1993). Seasonally high water temperatures, and reduced water flow in the connecting mainstems prevent migration and seasonally isolate local populations. The Pete Man Ditch on Clear Creek impedes upstream movement of bull trout from Lightning and Salmon creeks (Oregon Department of Fish and Wildlife *in litt*. 2000). No barrier culverts or unscreed diversions were identified by Claire and Gray (1993).

Middle Fork John Day River. Populations within the Middle Fork subbasin are at greatest risk from isolation due to habitat fragmentation, seasonally high water

temperatures, and reduced flows in the connecting mainstems (Oregon Department of Fish and Wildlife *in litt*. 2000). Bull trout are found in only three Middle Fork tributaries that are geographically distant. Population estimates for two of the tributaries are below 800 total fish of all ages, and existing data show no evidence of interchange between the local populations (Oregon Department of Fish and Wildlife *in litt*. 2000). There is a natural 5 meter (15 foot) waterfall on Bridge Creek that prevents access to approximately (11 miles) of good habitat, but bull trout likely never occurred there because of the barrier. (Oregon Department of Fish and Wildlife *in litt*. 2000). There is also a natural waterfall on Granite Boulder Creek that is a fish barrier, and no fish have been found above it (Claire and Gray 1993).

Upper Mainstem John Day River. Local populations in the upper mainstem subbasin are seasonally isolated due to high water temperatures, and reduced flows in the connecting mainstems. Multiple diversions in the core habitat on Strawberry Creek, prevent all upstream fish passage (Oregon Department of Fish and Wildlife *in litt*. 2000). A section of Indian Creek is virtually dewatered during the summer, isolating the small local bull trout population (Oregon Department of Fish and Wildlife *in litt*. 2000).

ONGOING RECOVERY UNIT CONSERVATION MEASURES

Efforts to recover anadromous fish species are ongoing in the John Day River basin with a high level of cooperation between agencies on a variety of projects. Spawning surveys have been a cooperative effort for many years. The John Day River basin has several active local watershed groups dedicated to finding workable solutions to restoring native fish runs. The following list of actions is by no means complete, but is representative of ongoing efforts within the recovery unit that provide at least some benefit to bull trout.

State of Oregon

The Oregon Department of Fish and Wildlife adopted changes in angling regulations to prohibit take of bull trout and modified regulations on other fisheries to reduce incidental take. Oregon Department of Fish and Wildlife no longer stocks hatchery trout in any flowing water, which should reduce competition with rearing bull trout for space and food, and has reduced or eliminated brook trout stocking programs. The Oregon Department of Fish and Wildlife hired a bull trout coordinator in 1995, to complete Statewide bull trout status assessment, map bull trout distribution, and develop conservation strategies for bull trout. The Oregon Department of Fish and Wildlife initiated a bull trout research project in 1997 that has been ongoing for several years. Oregon Department of Fish and Wildlife has also made permit changes to in-water work periods to better address bull trout needs.

When bull trout were listed a portion of the effort shifted to recovery planning. The Oregon Department of Fish and Wildlife has developed and distributed bull trout identification posters, and has a section 6 cooperative agreement with the U.S. Fish and Wildlife Service to support bull trout recovery actions. Funding through section 6 has been used to work cooperatively on spawning and habitat surveys, conduct research, and develop habitat projects in cooperation with the Confederated Tribes of the Warm Springs Indian Reservation, and U.S. Forest Service staff.

Federal Activities

The Bonneville Power Administration has provided funding for numerous anadromous salmonid and bull trout habitat and research projects conducted by the Oregon Department of Fish and Wildlife, U.S. Forest Service and the Confederated Tribes of the Warm Springs Indian Reservation in the recovery unit. The Bonneville Power Administration and U.S. Bureau of Reclamation have also provided funding for local Soil and Water Conservation districts, watershed councils, and the Confederated Tribes of the Warm Springs Reservation of Oregon to convert push-up dams to permanent features or pump/infiltration gallery systems.

The U.S. Forest Service is implementing Riparian Habitat Conservation Areas (stream corridor buffers) for present and future management activities on the national forests to protect streams from future degradation. The U.S. Forest Service has completed planting in some riparian areas burned intensely by the 1996 fires (Oriental Creek, Texas Bar Creek, Cable Creek, Hideaway Creek, South Fork Desolation Creek) to speed restoration of stream shade and large woody debris recruitment. The U.S. Forest Service has also fenced riparian areas and changed timing of livestock use to help recover riparian areas on the national forests. Road removal in portions of some national forests is being undertaken to reduce stream sedimentation over the long-term and help restore natural hydrologic function to the watersheds. The U.S. Forest Service has redistributed dredge tailing piles in the North Fork John Day River and the Clear/Granite creek system to restore floodplain function and natural river flow. The U.S. Forest Service can require plans of operation, including mitigation, which should reduce habitat damage from mining activities. The U.S. Forest Service has completed several habitat projects on Bull Run and Boulder Creek in the North Fork.

Nongovernmental Activities

Nongovernmental organizations have conducted a number of bull trout recovery tasks. The Nature Conservancy has established a preserve on the Middle Fork John Day River and will manage it to restore stream channel conditions in the

mainstem Middle Fork John Day River. The Northeast Oregon Assembled Land Exchange legislation would block up 13 miles of migratory bull trout habitat on the North Fork John Day River to be managed by the Prineville District of the U.S. Bureau of Land Management.

RELATIONSHIP TO OTHER CONSERVATION EFFORTS

State of Oregon

On January 14, 1999, Governor Kitzhaber expanded the Oregon Plan for Salmon and Watersheds to include all at-risk wild salmonids throughout the State through Executive Order 99-01. The goal of the Oregon Plan is to "restore populations and fisheries to productive and sustainable levels that will provide substantial environmental, cultural, and economic benefits." Components of this plan include 1) coordination of efforts by all parties, 2) development of action plans with relevance and ownership at the local level, 3) monitoring progress, and 4) making appropriate corrective changes in the future. It is a cooperative effort of State, local, Federal, Tribal and private organizations, and individuals.

The Oregon Department of Fish and Wildlife and Oregon Water Resources Department have established priorities for restoration of streamflow as part of the Oregon Plan for Salmon and Watersheds (Measure IV.A.8). The Oregon Department of Fish and Wildlife has prioritized streamflow restoration needs by ranking biophysical factors, water use patterns, and the extent that water limits fish production in a particular area. Oregon Water Resources Department watermasters will incorporate the priorities into their fieldwork activities as a means to implement flow restoration measures. The needs priorities will be used by the Oregon Watershed Enhancement Board as one criterion in determining funding priorities for enhancement and restoration projects. Watershed councils and other entities may also use the needs priorities as one piece of information to determine high priority restoration projects. Occupied bull trout streams in the recovery unit are included in the highest priority designation for streamflow restoration (R. Kruger, Oregon Department of Fish and Wildlife, 2001, pers. comm.).

Opportunities to convert existing out-of-stream flows to instream flows in Oregon are available through a variety of legislatively mandated programs administered by Oregon Water Resources Department, *e.g.,* transfers of type and place of use (ORS 536.050(4)), voluntary written agreement among water users to

rotate their use of the supply to which they are collectively entitled (ORS 540.150 and OAR 690-250-0080), allocation of "conserved water" to instream use (ORS 537.455 to 537.500), lease of all or a portion of consumptive water rights to instream purposes (ORS 537.348, OAR 690-77-070 to 690-77-077), exchange of a water right for an instream purpose to use water from a different source, such as stored water, surface, or ground water (ORS 540.533 to 540.543), and substitute a ground water right for a primary surface water right (ORS 540.524). Oregon Water Trust provides purchase of water rights from willing landowners for conversion to instream water rights.

Water Quality Management Plans will be developed to address forest, agricultural, urban and transportation sources of water quality impairment in the North Fork and Middle Fork John Day River subbasin in 2003, the upper John Day River subbasin in 2004, and the lower John Day River subbasin in 2005. Plans will be developed through the Oregon Total Maximum Daily Load determination process administered by Oregon Department of Environmental Quality.

The Agricultural Water Quality Management Program, established through the Senate Bill 1010 process (ORS 568.900 through 568.933), addresses water pollution associated with agricultural lands and activities. A final plan has been completed for the North and Middle Fork subbasin. The plan's primary strategy for reducing pollution will rely on a combination of educational programs, land treatment, implementation of sound management practices, installation of erosion control structures, and monitoring of implementation effectiveness (Oregon Department of Agriculture 2002).

Confederated Tribes of the Warm Springs Indian Reservation of Oregon

The Confederated Tribes of the Warms Springs Indian Reservation of Oregon are active in a number of conservation activities in the John Day River basin, as well as a treaty co-manager of fisheries resources with the Oregon Department of Fish and Wildlife. The Tribe maintains an office in the town of John Day, and implements watershed conservation programs, focusing on water conservation, riparian restoration, land acquisition, monitoring, research and planning (Northwest

Power Planning Council, 2001). In addition, the Confederated Tribes of the Warm Springs Indian Reservation of Oregon contributed to developing "WY-KAN-USH-MI WA-KISH-WIT" or "Spirit of the salmon", the Columbia River anadromous fish restoration plan of the Nez Perce, Umatilla, Warm Springs and Yakima Tribes (Columbia River Inter-Tribal Fish Commission 1995).

Confederated Tribes of the Umatilla Indian Reservation

The Confederated Tribes of the Umatilla Indian Reservation are treaty co-managers of fish and wildlife resources with the Oregon Department of Fish and Wildlife (Northwest Power Planning Council 2001). The Tribes activities include habitat conservation, fish passage, hatchery actions, and research (Northwest Power Planning Council, 2001). In addition, the Confederated Tribes of the Umatilla Indian Reservation contributed to developing WY-KAN-USH-MI WA-KISH-WIT or Spirit of the salmon, the Columbia River anadromous fish restoration plan of the Nez Perce, Umatilla, Warm Springs and Yakima Tribes (Columbia River Inter-Tribal Fish Commission 1995).

Local Planning Efforts

There are at least two active watershed councils in John Day River basin. The North Fork John Day River subbasin and Middle Fork John Day River subbasin have watershed coordinators listed on the Oregon Watershed Enhancement Board web site. In addition there are five soil and water conservation districts that operate within the basin. The Grant Soil and Water Conservation District has been working with the Bureau of Reclamation and other partners to convert push-up dams to other types of facilities that allow fish passage. The Monument Soil and Water Conservation District contributed to development of the agricultural water quality management plan for the North and Middle forks.

Northwest Power Planning Council's Subbasin Planning

As part of the Pacific Northwest Electric Power Planning and Conservation Act of 1980, the Bonneville Power Administration has the responsibility to protect, mitigate and enhance fish and wildlife resources affected by operation of Federal hydroelectric projects in the Columbia River and tributaries. The Northwest Power Planning Council develops and coordinates the Columbia River basin Fish and Wildlife Program that is implemented by the Bonneville Power Administration, U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, and Federal Energy Regulatory Commission. Coordination of Bonneville Power Administration's responsibilities for protection, enhancement, and mitigation and incorporation of recommendations by Northwest Power Planning Council is in part accomplished through the development of subbasin summaries, which identify status of fish and wildlife resources, limiting factors, and recommended actions at the subbasin level.

The draft John Day Subbasin Summary (Northwest Power Planning Council 2001) encompasses the John Day River Recovery Unit and is consistent with bull trout recovery planning efforts to identify limiting factors. The draft John Day Subbasin summary identifies elevated water temperature, degraded channel conditions, reduced instream habitat diversity, reduced streamflow, degraded riparian habitat, and restricted fish passage as contributing to the decline of bull trout. The John Day River Recovery Unit Team will continue to utilize this planning process to identify and seek funding for projects to aid bull trout recovery.